

Supporting Statement B for OMB 0596-0010

Collections of Information Employing Statistical Methods

Title: Forest Industries and Logging Operations Data Collection Systems

- 1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (for example, establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection had been conducted previously, include the actual response rate achieved during the last collection.**

Mill Survey: Data is collected from a stratified simple random sample of all known primary wood-using mills using harvested wood in log or chip form, such as sawlogs, veneer logs, pulpwood, and pulp chips, to manufacture products such as lumber, paper, and biomass energy. All known primary wood products industries in the United States, and Canadian mills that process wood from the United States, are sampled annually. Sample intensity will be dependent on the primary product and the state.

We estimate a total of 7,103 primary wood-using mills will be sampled during the 2027-2029 time-period covered by this Information Collection Request (Table 1). All primary wood-using mills will be contacted and/or accounted for during this survey for which the sample will be drawn. For respondents that are still in operation but cannot be contacted or decline to participate, historical information from previous mill responses, or other ancillary information is used. If a respondent is deemed to be out of business, it is removed from future surveys.

Table 1.—Number of primary wood-using mills by type of mill and data collection year (excluding proposed tests and cognitive survey)

Survey type	Total	Data collection year			Response Rate
		2027	2028	2029	2023
Pulpwood Producers	300	100	100	100	70%
Other Primary Wood Products Industries	6,803	2,390	2,266	2,147	

				57%
Total	7,103	2,490	2,366	2,247

Additionally, testing form lengths will require contacting 2,400 mills with a 3-question postcard and 98 mills with a shorter form, and performing cognitive interviews will involve contacting 500 mills for initial screening and invitation to participate in the interview, with 20 of those mills targeted for the cognitive interview.

Loggers Survey: The loggers' survey will be conducted on active logging sites visited as part of ongoing Harvest Utilization Studies, which are carried out annually across the nation to collect information on fell tree utilization.

Table 2.- Number of logging establishments (U.S. Census, 2023) and expected annual number of sites to visit

Logging Establishments	Operations per year	Average Response Rate
7,917	125-175	+85%

2. Describe the procedures for the collection of information including:

- **Statistical methodology for stratification and sample selection,**
- **Estimation procedure,**
- **Degree of accuracy needed for the purpose described in the justification,**
- **Unusual problems requiring specialized sampling procedures, and**
- **Any use of periodic (less frequent than annual) data collection cycles to reduce burden.**

Mill Survey: The annual sample of all primary processors provides a barometer of timber industry activity as well as information specific to current product demand for states that elect to participate is described in the sample design below.

Sample frame:

The USDA Forest Service Forest Inventory and Analysis (FIA) program maintains a current list of all facilities that accept roundwood in the United States. This list will include, at a minimum, the facility's name, location, type, primary roundwood product, number of employees, and previous total mill receipts (or estimated total

receipts if the facility is new). This list serves as the sampling frame and is updated annually.

Sample selection:

Several sampling designs were tested by Coulston et al. (2018) including simple random sampling, probability proportional to size sampling, and two types of stratified simple random sampling. The two types of stratified simple random sampling were (1) creating equal size cumulative measure of size strata by primary roundwood product and sampling 2 elements per strata, and (2) using Neyman allocation and cluster analysis to determine the number of strata per primary roundwood product and the sample size for each stratum. Recommendations from Coulston et al. (2018) were to use a stratified simple random sample where strata are determined by equal sizes of cumulative total facility receipts. This approach was shown to provide estimates significantly more precise than recommended in Forest Service Handbook 4809.11, Chapter 10 (5% sampling error for annual estimates of timber cut in the eastern United States, and 10% sampling error in the western United States).

FIA uses a three-level stratified simple random sample design to sample wood-using facilities. State is the first level. Primary roundwood product is the second level. The third level is developed by (1) identifying sampled with certainty strata for facilities with > 10 million cubic feet (cf) of receipts and then by (2) creating equally sized strata of cumulative previous facility total receipts (or estimated total receipts) for those facilities with ≤ 10 million cf of receipts. Two facilities will be selected at random within each third level stratum (except for the sampled with certainty strata). The target sampling fraction within each second level strata (State by primary product) is 0.4. However, because of the sampled with certainty strata, all pulp & paper mills that receive pulpwood (primary product) will be sampled.

Estimation:

We use the standard direct estimators for stratified simple random sampling from Cochran (1977). Under the stratified simple random sample design each N facility (i) belongs to a single strata h. The within strata selection probability is $\pi_{hi} = n_h/N_h$. The estimated population total for Y is then:

$$\hat{Y} = \sum_h^H \frac{N_h}{n_h} \sum_{i=1}^{n_h} y_{hi} \quad (1)$$

with estimated variance

$$\widehat{var}(\hat{Y}) = \sum_h^H \frac{N_h^2}{n_h} \left(1 - \frac{n_h}{N_h}\right) s_{yh}^2 \quad (2)$$

where

$$s_{yh}^2 = \sum_h \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (y_{hi} - \widehat{Y}_h)^2 \quad (3)$$

and

$$\widehat{Y}_h = \frac{1}{n_h} \sum_{i=1}^{n_h} y_{hi} \quad (4)$$

is the mean for stratum h.

Equations 1-4 are used when the desired estimate follows strata boundaries. These equations are modified to construct estimates for domains or subpopulations j that cross strata boundaries.

The estimated total for Y_j is then:

$$\widehat{Y}_j = \sum_h \frac{N_h}{n_h} \sum_{i=1}^{n_h} y_{hij} \quad (5)$$

with estimated variance

$$\widehat{var}(\widehat{Y}_j) = \sum_h \frac{N_h^2}{n_h} \left(1 - \frac{n_h}{N_h}\right) s_{yhj}^2 \quad (6).$$

Here we introduce the domain indicator I_j which takes the value of 1 when facility i is in the domain and zero otherwise. The indicator is then used in the construction of strata (h) and domains (j) means and variances:

$$s_{yhj}^2 = \sum_h \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (y_{hi} I_j - \widehat{Y}_{hj})^2 \quad (7)$$

and

$$\widehat{Y}_{hj} = \frac{1}{n_h} \sum_{i=1}^{n_h} y_{hi} I_j \quad (8).$$

Loggers Survey: Logging sites are selected assuming an infinite or uncountable population, as the population of sites depends on a state's logger capacity but also on weather and market conditions at a given time. This makes the size of the population varying and unknown. A state's sample size is determined using the utilization ratios' sample error tables developed by Zarnoch et al. (2004).

Sites are selected independently from a stratified population to allocate sites to all significant primary products including saw logs, veneer logs, pulpwood, composite panels, poles and pilings, posts, firewood, and other miscellaneous as applicable. Stratification is accomplished using information from a state's most current primary mill survey, which provides the species group and product type breakdown.

References:

Cochran, W.G. 1977. Sampling Techniques. John Wiley & Sons. New York. 428p.

Coulston, J.W., Westfall, J.A., Wear, D.N., Edgar, C.B., Prisley, S.P., Treiman, T., Abt, R.C., Smith, W.B. 2018. Annual monitoring of US timber production: rationale and design. Forest Science 64 (5), 533–543. <https://doi.org/10.1093/forsci/fxy010>.

USDA Forest Service. 2008. Operational procedures. First report of the Blue-Ribbon Panel on forest inventory and analysis. Forest Service Handb. 4809.11. Washington, DC: 11: 1-1.

Zarnoch, Stanley J.; Bentley, James W.; Johnson, Tony G. 2004. Determining Sample Size for Tree Utilization Surveys. Res. Paper SRS-34. Ashville, NC: U.S. Department of Agriculture, Forest Service. Southern Research Station. 11p.

- 3. Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling, a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.**

Mill Survey: Respondents are provided with several formats to provide information, using mail, phone, e-mail, or personal visits. These same methods are used for multiple follow up attempts to contact respondents. For respondents that are still in operation but cannot be contacted or decline to participate, historical information from previous mill response is used. If a respondent is deemed to be out of business, it is removed from the sample frame.

Loggers Survey: Loggers that allow entry to the site for fell tree data collection will be asked to participate in the survey. If a logger doesn't allow access to the site, then a replacement site is selected if available. If the logger allows entry to the site but declines to participate in the survey, then the record will be noted as non-response. To maximize response, survey questions will be asked and recorded on-site. No follow-up is needed.

- 4. Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.**

[To evaluate strategies for increasing participation and reducing survey burden, we propose conducting tests using different survey lengths. These modifications to FIA's mill](#)

collection approach aim to determine whether offering shorter or simplified questionnaires can enhance response rates and improve data quality for future collections.

Survey length and complexity have long been identified as factors that impact survey response rates. We propose to test the impacts of the mill survey length/complexity on response rates. The following experiment will be run in up to three states across the Northern U.S. The states will be selected based on a diversity of mill types and support from state partners. Across each state, the annual sample will be randomly divided into three treatments. One group will be the control (standard implementation). One treatment will consist of first sending all mills a short postcard and sending a subset of mills (the same as would be contacted in the base scenario) the full questionnaire. The third group will receive a version of the questionnaire that is roughly half the length of the standard survey, and all complex questions (e.g., matrices) are minimized. We expect to implement these tests with the start of our 2028 data collection.

5. Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.

Mill Survey: Sampling is based on methods developed by Coulston et al. (2018) (telephone number 865-206-4638) and adopted as described in chapter 5 of Westfall et al. (2022). Data will be gathered by FIA personnel or FIA representatives, University of Montana-Missoula Bureau of Business and Economic Research personnel, University of Massachusetts, Amherst, and collaborators from State agencies. All analysis will be done by FIA personnel.

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References:

Coulston, J.W., Westfall, J.A., Wear, D.N., Edgar, C.B., Prisley, S.P., Treiman, T., Abt, R.C., Smith, W.B. 2018. Annual monitoring of US timber production: rationale and design. *Forest Science* 64 (5), 533–543. <https://doi.org/10.1093/forsci/fxy010>.

Westfall, J.A.; Coulston, J.W.; Moisen, G.G.; Andersen, H.-E., compilers. 2022.

Sampling and estimation documentation for the Enhanced Forest Inventory and Analysis Program: 2022. Gen. Tech. Rep. NRS-GTR-207. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 129 p.
<https://doi.org/10.2737/NRS-GTR-20>.

Zarnoch, Stanley J.; Bentley, James W.; Johnson, Tony G. 2004. Determining Sample Size for Tree Utilization Surveys. Res. Paper SRS-34. Ashville, NC: U.S. Department of Agriculture, Forest Service. Southern Research Station. 11p.